

ENHANCEMENT OF INTERMEDIATE MASS DILEPTONS FROM CHARM DECAYS AT SPS ENERGIES *

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Dileptons are important signals in high energy heavy-ion collisions. Depending on their invariant masses they can probe the collision processes at different stages. Low invariant-mass dileptons are predominantly produced at late stage of the collisions. So they provide information about the medium modification of hadron properties such as mass and spectral functions. A large enhancement of low invariant-mass dileptons has indeed been observed in HELIOS-3 and CERES experiments. Many theoretical studies attributed this enhancement either to a dropping ρ -mass in a medium of high baryon-density, or to a collisional broadening of hadronic spectral functions.

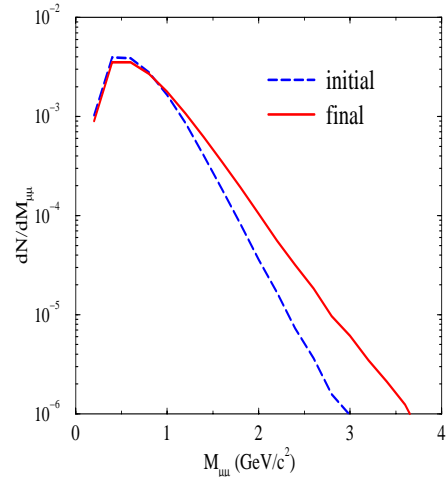
At large invariant mass, dileptons are mostly produced from partonic processes in the early stage of heavy-ion collisions. For example, dileptons from Drell-Yan process dominate the large invariant mass region at the CERN-SPS energy. Thus they can provide a benchmark for parton luminosity or the centrality of the collisions in which proposed signals of the phase transition to the quark-gluon plasma such as J/ψ suppression and thermal dileptons can be studied via the dilepton channel. However, at collider energies such as the BNL RHIC and CERN LHC, Drell-Yan no longer dominate the dileptons at reasonably large invariant mass. Dileptons from decays of charm and bottom mesons instead dominate.

As one can naively expect, both partonic and hadronic processes will contribute to dileptons with invariant masses between above noted regions, or the intermediate mass region (IMR).

We focus in this paper on another possible scenario in which IMR dileptons can be enhanced in the acceptance of NA50 $Pb + Pb$ experiment. We demonstrate that modification of the phase space distribution of D-mesons due to final state rescatterings can change the shape of the dilepton distribution in phase space. Since most experiments only measure a small part of the whole phase space, the redistribution of the dileptons from decays of charmed mesons can give rise to an apparent enhancement of IMR dileptons within the limited acceptance of the

experiments.

We found that the dimuon yield from open charm decays inside the NA50 acceptance is significantly enhanced as a result of final-state rescatterings on D-mesons in $Pb + Pb$ collisions at SPS energies, consistent with the preliminary findings on intermediate-mass-region dimuons from the NA50 experiment. The key effect is the broadening of D-meson m_T spectra, which can be roughly represented by the increase of T_{eff} , the inverse slope of the m_T spectrum. More studies can be done within this model. The centrality dependence of the enhancement can be studied and compared to the preliminary data from NA50, which shows the dependence of the enhancement factor on the total E_T . The p_\perp dependence of the enhancement can also be studied by applying various p_\perp cuts, and a larger enhancement is expected when more stringent energy cut is applied to single muons. However, the ultimate test of this model should come from direct measurements of D-meson spectra.



Invariant-mass spectra of dimuons from charm pair decays inside the approximate NA50 acceptance.

*Phys. Lett. **B444**, 245(1998)